



The Effect of Walking and Yoga on Blood Glucose Levels in Type II Diabetes

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ABSTRACT

Background and aims: Diabetes is a metabolic disease cause to interfere in normal metabolism. Diabetes can't be cured, but it can be controlled by other methods including: safe exercise (Yoga- walking ...). The aim of the this study was to determine the effect of one-month regular Yoga and walking exercise on blood sugar levels in type 2 diabetic patients. **Method:** This Semi-Experimental study was conducted on 60 volunteer with diabetic type 2. The Participants randomly were divided in to 3 groups: 20 patients on any group (yoga, walking, and control). Yoga and walking groups practiced for 45 minutes daily for 30 days. Data were analyzed using spss win 16. P-value was considered less than 0.05 as significance criteria. **Results:** The differences according to age, sex, and education level and number of tablet were not significant ($p > 0.05$). The initial Fast Blood glucose didn't show significant difference ($p > 0.05$). After 1 month, the difference between blood glucose was significant in yoga and walking groups and between yoga and control groups. However, this difference was not significantly between walking and control group. Number of tablet between the three groups was not significant after 1 month ($p > 0.05$). In 3 groups a significant difference was observed in Fast Blood glucose on bases repeated measurement test. ($p < 0.05$) **Conclusion:** According to the findings, a month of exercise (yoga - walking) was effective in reducing blood glucose levels and in compare between yoga and walking, yoga exercise is more effective in reducing blood glucose levels.

Keywords Blood Glucose; Yoga; Walking; Diabetes.

INTRODUCTION

Diabetes mellitus does not have a single definition. Diabetes is a complex chronic illness that Cause to interfere in normal metabolism (carbohydrates, fats and proteins). Diabetes has Complication on Micro vascular and Macro vascular (1).

In other words, Diabetes is a metabolic disorder (2). Research was conducted in 2009 by Aziminezhad which demonstrated that almost 190 million people are with diabetes in the world and is predicted to be near 330 million in 2025 (3). Also, obesity and reduced physical activity increase the prevalence of type2 diabetes (1-4). The prevalence of type 2 diabetes is near 1.2% to 14.6% in Asia 6.4% to 40% in Middle East, and 1.3% to 14.7% in Iran (3). The research conducted in 2008 by Azimineghad; indicate that 5/8% of women and 5/1% of men have diabetes (3).

Diabetes can't be cured, but it can be controlled by other methods, such as exercise (5-6). Yoga is a series

of physical and breathing and stretching exercises (6-7). There is a relationship significant between mind and health. The base of yoga is, create an adjustment between mental healths (psychology – nervous) with physical health to increase the quality of life (7).

Physical practicing in yoga, increase the blood circulation that at this why increase, oxygen absorption and hormonal system performance .also relaxation in yoga cause to improve the autonomous nervous system functional (7). Ross's study(2010) showed that yoga can be useful in reducing pain(37%), fatigue (25%), sleep disturbance,55%,and cholesterol(25%)compared to other methods(8). In a comparative study, which was conducted in 2010, yoga was shown as an effective exercise to improve glucose (9-10), lipid profiles (10) and stress (10-11). Yoga is more effective in reducing fatigue, increasing balance and social functioning (8). In Study of Aljasir (2008) results indicate that yoga is helpful in upper than 50% of patients with diabetes (12). Exercise and walking are two excellent ways to control Type 2 diabetes and health promotion for people with diabetes (13). As walking 10,000 steps foot or 5 miles a day can reduce take up insulin almost 25%, (13). Studies show that walking 3-4 times per week, 30-

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60 minutes each time can be effective in reducing blood glucose in diabetics (14-15-16).in yoga all part of joints are used but it isn't in other sports. Yoga is shown to be more capable than any other sport. Thus, the aim of this study is to compare walking with Yoga effects on blood glucose level in patients' with type 2 diabetes.

MATERIAL AND METHOD

This study was conducted in republic Islamic of Iran in Qazvin city in 2012. In this Semi-experimental study, According to the study criterion (person must have type 2 diabetes and taking pills (metformin 500mg – glibenclamide 5mg) to control of their disease. Persons must sign up testimonial and their age was between 30-55 years.) and final criterion of study (Person who had muscle -skeletal –heart-vessels and breathes disease and had problems in doing physical exercises. Persons who encountered problems in time of research and have to use Insulin or couldn't do exercise), To allocate 60 (according to past study * and formula) patients(male -female),30-55year old patients with Type 2 diabetes were randomly stratified assigned to three groups yoga, walking and control. Each sample were assigned a number, The first patients were used in the yoga group, two patients in walking groups and third patient in control group and so on.

* The Effects of Free-Living Interval-Walking Training on Glycemic Control,Body Composition, and Physical Fitness in Type 2 Diabetes Patients. Writer: KRISTIAN KARSTOFT(2012)

* Effect of yoga asana and pranayama in non-insulin depenent diabetes mellitus. Writer:V.Malhotra(2003)

$$n = \frac{2 \left(z_{1-\frac{\alpha}{2}} + z_{1-\beta} \right)^2 \delta^2}{d^2}$$

$$n = \frac{2(1.96 + 0.85)^2}{17^2} 19.5^2 = 20.7$$

$$\alpha_1=0.05 \quad z_{1-\frac{\alpha}{2}} = 1.96 \quad d=17$$

$$1-\beta = 0.80 \quad z_{1-\beta} = 0.84 \quad \sigma = 19.5$$

This article was confirmed in Iranian Registry of Clinical Trials (IRCT201107247101N1) and Qazvin medical university (number d/6/3659)

Study's purpose explained and one written testimonial certified.

We have used a Questionnaire which was validated by a dissertation in Qazvin University of Medical Sciences. Questionnaire justifiability was approved by faculty of Qazvin University of Medical Sciences including 15 persons with expertise of coach and PhD student. Also questionnaire durability was approved by the test tri-

ple in 10 samples within 3 weeks later who were not involved in the study.

After providing written consent from all individuals, we have measure are variables in each group, a questionnaire containing 15 questions (4questions about demographics-6questions are about diabetes history and 5 questions are about sports history).

The groups were randomly selected for our three groups by drawing method. Patients were tested twice for FBS. (One day before the first day of training—one day after the final day training course). The patient was told to fast at least 8 hour prior to Fast Blood glucose checking. Blood glucose was measured by glucometer (ZD) (GM300).

PROTOCOLS OF THE GROUPS

Educational programs and laws that were registered for walking was as follow: After breakfast walking must be done for 30 days in the morning and 45 minutes daily. These persons did exercise in a same place and same time.

They were not permitted to eat food or desert with exception of water also were not allowed to listen to music. (Due to lack of uniform environmental conditions in both groups), and they had to answer the questions regarding their walking method. We had at raining program for the yoga group was as follow: After breakfast yoga exercises must be done for 30 days in the morning and for 45 minutes daily. A Single Yoga exercises instructor performed similar lessons through all sessions.

STATISTICAL ANALYSIS

All data were entered and analyzed by SPSS version 16. The data were tested for normal distribution by One-Sample Kolmogorov-Smirnov Test. The Levin test for equality of variances was tested. For comparing the data, independent samples T-test, paired samples T-test, ANOVA, Post hoc test and chi2 were used, a p-value less than 0.05 was considered as significant.

RESULTS

Mean ageing in 3 group was 46 years .There was no significant age difference among groups.(p=0.793)(Table1).

From 60 persons of 3 group, 25 (41%) were men and 35(58%) were female There was no significant gender difference among groups (p = 0.937). (Table1)

Most people in the yoga group (35%) had secondary level education. Most people in the Walking groups (30%) and controls (40%) had primary level education .there was no statistical difference between the groups in levels of education. (P = 0.765)

Among the three groups of subjects ((45%) 24) were taking 2 tablets daily. there was no statistical differ-

ence between the groups in count of pills that consume in 24 hour (Table2)

The initial FBS was not significantly different; however, In 3 groups a significant difference was observed in FBS on bases repeated measurement test. ($p=0.024$) with difference was mainly seen between Yoga and control groups. (Table3)

Blood glucose significantly decrease in the yoga groups ($p=0.017$) however, the other groups did not have any Significant difference after the intervention. ($p=0.097$) (Table 4)

Number of tablet between the three groups was not significant before and after 1 month ($p>0.05$) ($p=0.291$)

DISCUSSION

In this study, a month of regular exercise, yoga and walking on blood glucose levels of people with type2 diabetes had a significant impact. This findings are in agreement with many other studies that show yoga and walking have positive effects on blood glucose levels (2-6-12-17-18). Each of these studies have been performed in a singles port. In this study most people were 46 years. Which was similar to Haghdoost's study (2009) which said the diabetes between 40-60 is higher than another years (19)

This is because with increasing age, activity decreases and weight gain increases patients and causes fat storage and weight gain around the abdomen and upper body, especially in women after menopause. Activity and less weight gain, reduce body insulin action and insulin resistance occur (20)

In this study, in all three groups, women were more than men. These results are consisting with the results of Azimineghad's study (2008) that the prevalence of diabetes was 5.8% among women and 5.1% among men the prevalence of diabetes (3). In Haghdoost's study (2009) had 1.7% more women than men (19). It seems that women in Iran spend most of their time at home and does Minimal physical activity at this why increase the body fat, it making them more prone to diabetes (3-19).

In this study most people who have studied in elementary school have diabetes and this result is consistent with the results of Azimineghad's study, he noted that the prevalence of diabetes is higher in people with low literacy (3). Due to loss of knowledge related to the diabetes (what is the prevention or treatment), diabetes is the more in this level of education.

According to the study, based on a month of exercise (yoga -walking) on blood glucose levels, according to study results and the comparison between the discriminate variables, the impact of one month of yoga exercise to reduce blood glucose levels was significant ($P=0.004$). Though walking group was reduced but not statistically significant ($P=0.12$).

Many studies have shown yoga improving diabetes. Some of them have mentioned up to upper than 50 percent of the beneficial effects of treating diabetes with yoga (12) Evidence shown that yoga can have a therapeutic effect on type 2 diabetes. The present study compared yoga with walking groups and control, blood glucose levels in the yoga group showed a significant decrease compared to walking. In many studies yoga have decrease blood glucose (2-6-12-17-18). In similar studies, such as: Amita's study (2009) of glucose decreased 159 to 137. (2) But in Skoro's study (2005) Yoga has no significant effect on blood glucose (21). In general seems to yoga cause to reproduce pancreatic cells. Increase fat percent, cause to decrease in sensitivity to insulin and higher insulin resistance but don't worry because yoga causes to decrease the fat percent (22). Yoga causes to decrease free fatty acid, it that to improve β cell function. (23) Walking group, blood glucose levels were lower than the control group, but the difference was not significant, walking group had less loss than yoga group. In Karstoft's study (2008) walking cause to lowers blood glucose- triglyceride (14). This result wasn't consistent with the results of Karstoft's study. This was due to consume level of calorie and the time of intervention (45 minute). The variable Number of tablet, after the intervention in any of the three groups, no difference was observed. Normand's (2011) and Sharoff's (2010) study suggested that the combination of metformin treatment and exercise does not reduce blood glucose. As a result, the number pills will not reduce (24-25). These results are consistent with the results of the present study. In Saha's study (2007) of 20 patients with diabetes who were 50-66 years old, the results indicated that the average tablets from 1.47 to 0.55 reached (23). These results are not consistent with the results of the present study. Perhaps this lack of consistency is due to the interference term.

According to the findings, 1 month of exercise (yoga -walking) was effective in reducing blood glucose levels comparing yoga and walking. According to Authors' Hypothesis: Yoga exercise effective in improving blood glucose levels than walking. In yoga all part of joints are used but it isn't in other sports. Yoga is shown to be more capable than any other sport in significant reduction in blood glucose level. Thus, the aim of this study is to compare walking with Yoga effects on blood glucose in patients' with type 2 diabetes. This type of exercise can be helpful for patients And on the other hand due to the many available free walking exercise, the authors concluded that exercise (yoga -walking) improve the physical health of people with diabetes promoting sense of health and education departments in the medical community should be considered.

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Table 1: Comparison of gender and age groups

group	mean age	gender	
		N and p of male	N and p of female
yoga	47.6±6.21	8 (40%)	12 (60%)
walking	45.8±10.0	8 (40%)	12 (60%)
control	46.9±7.8	9 (45%)	11 (55%)
total	46.8±8.0	25 (41.7%)	35 (58.3%)
P value p=0.793		P value p=0.937	

N and p: The number and percentage

Table 2: Comparison of Number Of Tablet (metformin – glibenclamid) groups

group	Number Of Tablet (metformin – glibenclamid)						
	1.00	2.00	3.00	4.00	5.00	6.00>	Total
yoga	2 (10%)	9 (45%)	3 (15%)	2 (10%)	2 (10%)	2 (10%)	20(100%)
Walking	6(30%)	6 (30%)	2 (10%)	3 (15%)	1 (5%)	2 (10%)	20(100%)
control	4 (20%)	9 (45%)	1 (5%)	4 (20%)	1 (5%)	1 (5%)	20(100%)
Total	12 (20%)	24 (40%)	6 (10%)	9 (15%)	4 (6/7%)	5 (8/3%)	60(100%)

This table showed : count of pills that consume in 24 hour

Table 3: Comparison of the Blood Sugar intervention groups together

Variable	Group	Mean±SD	F	P Value
BG(1)	Yoga	162.3±43.2	2.965	.060
	Walking	217.7±90.7		
	Control	190.7±73.7		
BG(2)	Yoga	137.5±34.8	3.970	.024
	Walking	194.7±89.7		
	Control	194.0±83.6		

BG 1: Blood Glucose (early intervention)

BG2: Blood Glucose (end intervention)

Table 4: Comparison of blood glucose in the intervention group

Dependent variables	Group		mean	Standard deviation	p.value	95% Confidence level	
						Lower Bound	Upper Bound
Blood Glucose (after of intervention)	yoga	walking	-57.150	23.277	.017	-103.761	-10.538
		control	-56.450	23.277	.018	-103.061	-9.838
	walking	yoga	57.150*	23.277	.017	10.538	103.761
		control	.700	23.277	.976	-45.911	47.311
	control	yoga	56.45000*	23.27717	.018	9.8383	103.0617
		walking	-.70000	23.27717	.976	-47.3117	45.9117

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